Progress Check

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1. **Mention whether the following statements are True(T) or False(F)**
   - **(i) Plumule is the future root and radicle the future shoot of the plant. T/F**
   - **(ii) Micropyle serves for the emergence of the radicle. T/F**
   - **(iii) Cotyledons in castor are a big store of food for the embryo. T/F**
   - **(iv) Maize grain has a large endosperm. T/F**
   - **(v) Tegmen is the outmost layer of the seed. T/F**

Solution:

(i) The statement is false. The plumule is the future shoot and the radicle is the future form of root.

(ii) The statement is true.

(iii) The statement is true.

(iv) The statement is true.

(v) The statement is false. It is a thin layer lying next to the testa.

Progress Check

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1. **Fill in the blanks by choosing the correct alternative**
   - **(i) In a dry seed the embryo is in _____ state(active/quiescent)**
   - **(ii) Water is absorbed by the seed mainly through _____ (entire surface/micropyle)**
   - **(iii) Very low temperature _____ the growth of embryo (inhibits/destroys)**
   - **(iv) Germination in pea is _____ (epigeal/hypogeal)**
   - **(v) Coleoptile is a part found in the germinating _____ (castor/maize).**
   - **(vi) Alkaline pyrogallic acid is used for absorbing _____ during experiments on germination (oxygen/carbon dioxide)**

   Solution:

   (i) Quiescent
   (ii) Micropyle
   (iii) Inhibits
   (iv) Hypogeal
   (v) Maize
   (vi) Oxygen

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A. Multiple Choice Type

1. Which one of the following plant parts is correctly matched with one of its stated characteristic?
(a) Mango seed _____ aleurone layer
(b) Bean seed _____ endosperm
(c) Maize grain _____ coleoptile
(d) Wheat grain _____ exalbuminous
Solution:
(c) Maize grain _____ coleoptile
The plumule of the maize pierces through its protective sheath, the coleoptile to grow upwards. It is one of the protective sheaths.

2. Seeds sown very deep in the soil fail to germinate because they
(a) Cannot exert enough force to push the soil upward.
(b) Do not get enough sunlight.
(c) Get to much water.
(d) Do not get enough oxygen
Solution:
(d) Do not get enough oxygen
For germination of the seeds sown, oxygen is required.

B. Very Short Answer Type

1. Answer the following statements true (T) or false (F)?
(a) Some seeds have no cotyledons at all. T/F
(b) Maize grain is fruit and not a seed. T/F
(c) Seeds fallen in a flower-bed from the previous crop usually do not germinate until the next sowing season. T/F
(d) Oxygen is necessary for the germination of seeds. T/F

Solution:
(a) The statement is false. Some seeds have one cotyledon (monocots) while others have two cotyledons (dicots).
(b) The statement is true.
(c) The statement is true.
(d) The statement is true.

2. Name the following:
(a) A monocotyledonous endospermic seed.
(b) A chemical used in experiments, which absorbs oxygen.
(c) Part of the plumule above the embryonic axis of the seed.

(d) A plant which shows viviparous germination.
(e) The layer of endosperm of maize, rich in protein.
(f) A seed with folded plumule leaves.

Solution:

(a) Maize
(b) Pyrogallic acid
(c) Shoot
(d) Rhizopora
(e) Aleurone layer
(f) Bean

3. Fill in the blanks:

(a) In bean seeds, _____ grows faster and the seeds are brought _____ ground.
(b) _____ is a protective layer of radicle and _____ protects the rolled plumule.
(c) A seed is protected by _____ and _____
(d) Seeds absorb water through _____ which also helps in diffusion of respiratory gases.
(e) Rice, wheat, and maize are rich in _____ food.

Solution:

(a) Plumule, above
(b) Coleorhiza, Coleoptile
(c) Seed coat, testa
(d) Micropyle
(e) Starch

4. Arrange the following set of terms in order, so as to be in logical sequence. Rewrite the correct order.

(a) Embryo, 1st male gamete, zygote, egg cell, micropyle.
(b) Zygote, embryo, seed, allogamy, fusion of gametes.
(c) Seed coat bursts, hypocotyl elongates, radicle grows downwards, hypocotyl forms loop above the soil, epicotyl elongates.

Solution:

(a) Micropyle, 1st male gametes, egg cell, zygote, embryo.
(b) Allogamy, fusion of gametes, zygote, embryo, seed.
(c) Seed coat bursts, radicle grows downwards, hypocotyls from loop above the soil, epicotyl elongate

C. Short Answer Type

1. What is the difference between an embryo and a seed?

Solution:

Listed below are the differences between an embryo and a seed:

Embryo	Seed
It remains within the seed in a dormant	It is a mature ovule after fertilization

or inactive state unless exposed to favorable conditions which causes germination.	and contains a small living part referred to as the embryo.

2. **Give any two examples each of endospermic (albuminous) seed, and non-endospermic (exalbuminous) seeds.**

Solution:

Listed below are the examples for each:
Endospermic (albuminous) seed – Maize, Castor, Poopy
Non-endospermic (exalbuminous) seed – Gram, pea, bean

3. **Germinated grams are considered highly nutritive. What is the reason for this belief?**

Solution:

Germinated grams are considered to be highly nutritive as the seed cotyledon absorbs food from the endosperm causing it to get nutritive since it is rich in starch and the outermost layer is richly supplied with proteins.

4. **Why do we not use the terms maize fruit and maize seed? What do we say instead?**

Solution:

Factually, maize grain is a fruit wherein the seed coat and the fruit wall are united to form the protective layer. Hence, we are not familiarized with the terms maize fruit or maize seed. These are instead addressed as grains.

D. Long Answer Type

1. **What are the functions of the following in a seed?**
   (a) Seed coat
   (b) Micropyle
   (c) Cotyledons
   (d) Radicle
   (e) Plumule

Solution:

Listed below are the functions of the following:
(a) Seed coat – The seed coat renders protection from attack of fungi, insects, bacteria and injury to the delicate inner parts of the seed.
(b) Micropyle – It allows entrance of water into the seed through the pore during germination.
(c) Cotyledons – They store the food required for the embryo.
(d) Radicle – They go on to form the future root.
(e) Plumule – They go on to form the future shoot.

2. **Suggest an experiment to prove that a suitable temperature is necessary for germination.**

Solution:

The following experiment can be used to prove the above.

Aim:
To prove that a suitable temperature is necessary for germination.

Materials Required:
- Beakers(2)
- Cotton wool(wet)
- Refrigerator

Procedure:
- Label two beakers A and B.
- In each of the beakers, place a few gram seeds on a wet cotton wool.
- Place beaker A at ordinary room temperature and beaker B in the refrigerator.
- In a matter of one or two days, the seeds in beaker A germinate depicting the significance of an appropriate temperature for the process of germination.
- No signs of germination are observed in beaker B, they may germinate in a few days, though not as much as that in beaker A.

Conclusion:
For seeds to germinate, temperature plays a key role. Suitable temperature is required for seed germination.

3. Sometimes the potatoes kept in a basket during the rainy season start giving out small shoots. Would you call it germination? Give reason in support of your answer.
Solution:
Shoots appearing from potatoes can certainly be referred to as germination.
It is due to the changes occurring within that lead to the formation of a seedling on the whole for germination. The hypocotyl or the epicotyl elongate during the process of germination.

4. Give two differences in each of the following pairs:
(a) Epigeal germination and hypogeal germination
(b) Coleorhiza and coleoptile.
(c) Bean seed and maize grain.
Solution:
Listed below are the differences:
(a) Epigeal germination and hypogeal germination

Epigeal germination	Hypogeal germination
Cotyledons are observed being pushed above the ground.	Cotyledons are observed being underground.
Elongation of hypocotyl	Elongation of epicotyl

(b) Coleorhiza and coleoptile.

Coleorhiza	Coleoptile
Forms as a protective sheath of radicle	Forms a protective sheath of plumule
Located at the pointed tip of the embryonic area	Located at the upper broader side of the embryonic area.

(c) Bean seed and maize grain

Bean seed	Maize grain
It has two cotyledons	It has one cotyledon
Endosperm absent	Endosperm present(large)

5. Differentiate between germination and vivipary.

Solution:

Listed below are the differences between germination and vivipary.

Germination	Vivipary
Germination is when the seed that encloses the embryo activates and initiates the growing processing into a plant.	The germination of the seed enclosed in the fruit while it is still attached to the parent plant is referred to as vivipary.

6. Justify the statement that the maize grain is a 'one seeded fruit'.

Solution:

An enlarged ripened ovary is referred to as a fruit wherein the ovarian wall goes onto form the fruit wall which envelops the seed.

Functions of the fruit –

- Renders protection to the seed
- Assists in seed dispersal

The maize grain is referred to as a one-seeded fruit as the seed coat and the fruit wall are united for the formation of a protective layer. This kind of a fruit is referred to as a grain.

7. What is the role played by the hypocotyl in epigeal germination?

Solution:

Epigeal germination is the germination of a seed occurring above the ground level. In this type of germination, the hypocotyl develops to grow for the formation of a loop above the soil. It then elongates thereby pushing the cotyledons through the ground upwards.

8. With regard to germination in bean seed, answer the following questions:

(a) State the function of the 'Micropyle'.

(b) Name the part of the seed that grows into the seedling.

(c) Name the part of the seed that provides nutrition for the growing seedling.

(d) Draw a neat labeled diagram of a mature bean seed.

Solution:

(a) Function of Micropyle –

- Enables water absorption making it accessible to the embryo for germination.
- Allows respiratory gas diffusion for the growing embryo.

(b) The part of the seed that grows into the seedling is the embryo.

(c) The part of the seed that provides nutrition for the growing seedling is the cotyledon.

(d) Diagram of a mature bean seed is as follows: